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Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of

Amendment of Parts 21 and 74 to Enable  
Multipoint Distribution Service and  
Instructional Television Fixed Service  
Licensees to Engage in Fixed  
Two-way Transmissions

)  
)  
) MM Docket No. 97-217  
)  
) File No. RM-9060  
)  
)

**CONSOLIDATED COMMENTS AND PARTIAL OPPOSITION**

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Appendix A

## EXECUTIVE SUMMARY

Most of the petitions seeking further reconsideration in this proceeding propose beneficial rules and policies designed to advance the emergence of Multipoint Distribution Service ("MDS") and Instructional Television Fixed Service ("ITFS") as a delivery vehicle for innovative digital video, voice and data services to a variety of consumers. To this end, the Petitioners support BellSouth's petition for reconsideration of the Commission's provisions permitting an ITFS licensee to assign its license without concurrently assigning its rights and obligations under its excess capacity lease. In extending the maximum length of excess capacity lease terms, the Commission recognized that infrastructure investment for digital operations entails substantial costs that must be recouped over time. Allowing ITFS licensees to assign their licenses without the excess capacity lease agreements will only diminish the likelihood of recoupment, inhibiting investment and devaluing the ITFS spectrum. Also, as noted in their own petition, Petitioners agree with BellSouth that the Commission has inadvertently failed to amend Section 74.931(c)(3) to reflect that MDS and ITFS licensees using analog modulation may engage in channel shifting.

Petitioners also support IPWireless's proposal that the "Qualcomm exception" allowing low-power response stations to utilize non-directional antennas be codified. Further, petitioners do not oppose IPWireless's proposal to loosen the out-of-band emissions limitations on responses stations transmitting with an EIRP of -6dBW or less per 6 MHz channel. However, to protect the noise floor of systems, the Commission should issue a clarification of Sections 21.908(d) and 74.936(f) to require that response station transmitters be biased off so that no RF Gaussian noise will be emitted when the response station is not engaged in transmitting.

Petitioners also do not oppose Catholic Television Network's ("CTN") call to clarify that ITFS receive sites registered prior to the cutoff date not lose their registered status in the context of a channel swap or a technical modification and that MDS and ITFS licensees are obliged to cooperate to identify sources of interference. However, adoption of CTN's proposal to permit the registration of receive sites beyond the boundary of the 35-mile radius protected service area would preclude neighboring licensees from equally enjoying the benefits of the new rules. It is not difficult to conceive a single distant registered receive site preventing the neighboring ITFS licensee from making system modifications that would benefit thousands of students. This is not to say that distant receive sites cannot be deployed. However, just as when MDS licensees provide service outside their PSA, ITFS licensees should only be allowed to establish new receive sites outside their PSA on a secondary basis.

Lastly, CTN raised several issues regarding Appendix D of the original *Report and Order* in this proceeding. The technical consultant to the Petitioners has engaged in a dialog with CTN's consulting engineer and others, and the Petitioners are proposing several corrections, clarifications and improvements to Appendix D as a result.

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**CONSOLIDATED COMMENTS AND PARTIAL OPPOSITION**

The over 110 wireless communications system operators, Commission licensees, equipment manufacturers and consultants who were parties to the Petition for Rulemaking that commenced this proceeding (collectively, the “Petitioners”), by their attorneys and pursuant to Section 1.429(f) of the Commission’s Rules, hereby submit their comments regarding the Petition for Reconsideration filed by IPWireless, Inc. (“IPWireless”) and the Petition for Further Reconsideration filed by BellSouth Corporation and BellSouth Wireless Cable, Inc. (“BellSouth”), along with their opposition in part to the Petition for Clarification and Further Reconsideration submitted by Catholic Television Network (“CTN”) with respect to the *Report and Order on Reconsideration* (the “*Reconsideration Order*”) in this proceeding.<sup>1/</sup>

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<sup>1/</sup> See *Amendment of Parts 1, 21 and 74 to Enable Multipoint Distribution Service And Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions; Request for Declaratory Ruling on the Use of Digital Modulation by Multipoint Distribution Service and Instructional Television Fixed Service Stations*, 14 FCC Rcd 12,764 (1999) [hereinafter cited as “*Reconsideration Order*”]. A listing of the Petitioners was included as Appendix A to the *Reconsideration Order*.

## I. THE BELL SOUTH PETITION.

As a general proposition, many of the petitions seeking further reconsideration of the *Reconsideration Order* propose useful revisions to the rules and policies that will guide the emergence of Multipoint Distribution Service (“MDS”) and Instructional Television Fixed Service (“ITFS”) as a delivery vehicle for innovative digital video, voice and data services targeted at a variety of business, residential and educational markets. For example, the Petitioners applaud BellSouth for seeking reconsideration of the retention of the Commission's policy against ITFS excess capacity lease provisions that bar the ITFS licensee from assigning its license without concurrently assigning the rights and obligations under the excess capacity lease.<sup>2/</sup> This policy, which the *Reconsideration Order* justifies on the ground that “banning such provisions enhances the ITFS licensee's flexibility in finding a buyer should it decide to sell,”<sup>3/</sup> represents the last vestige of the paternalistic approach to excess capacity lease regulation that the Commission claimed to have eliminated with the *Report and Order* in this proceeding.<sup>4/</sup> As BellSouth correctly notes, although the policy was purportedly intended to increase the value of ITFS licenses, it has just the opposite effect – “devalu[ing] the ITFS spectrum to the detriment of the ITFS licensee” because operators will

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<sup>2/</sup> See Petition for Further Reconsideration of BellSouth Corporation and BellSouth Wireless Cable, Inc., MM Docket No. 97-217, at 3-11 (filed Dec. 21, 1999)[hereinafter cited as “BellSouth Petition”].

<sup>3/</sup> *Reconsideration Order*, 14 FCC Rcd. at 12793.

<sup>4/</sup> See *Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service And Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions*, 13 FCC Rcd 19112, 19172, 19180 (1998) [hereinafter cited as “*Report and Order*”].

be unwilling to make substantial investment in ITFS spectrum without the assurance that the channels will be available throughout the lease term.<sup>5/</sup>

In fact, the Commission's policy is impossible to square with its own recognition in the *Report and Order* that "the conversion to digital operations, whether two-way or merely downstream, will entail a substantial increase in operational and infrastructure costs," and that as a result, fifteen year excess capacity lease terms will be necessary because "the investment community will require even far greater comfort regarding the long-term availability of excess capacity on ITFS channels."<sup>6/</sup> If the Commission recognizes on one hand that longer-term leases are necessary to justify investment in ITFS spectrum, how can it on the other hand allow an ITFS licensee to walk away from its obligation to provide the operator access to the spectrum throughout the term? Thus, the Petitioners once again join BellSouth in calling for the Commission to allow ITFS licensees to reap the additional benefits that commercial operators will be able to provide if, but only if, the commercial operator has assured access to the excess ITFS spectrum for the full term of the lease.<sup>7/</sup>

Similarly, the Petitioners agree with BellSouth that the Commission has inadvertently failed to amend Section 74.931(c)(3) to reflect that MDS and ITFS licensees operating utilizing analog modulation may engage in channel shifting.<sup>8/</sup> Just as the Petitioners noted in their own petition for further reconsideration, although the *Reconsideration Order* announces a decision by the

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<sup>5/</sup> BellSouth Petition, at 7.

<sup>6/</sup> *Report and Order*, 13 FCC Rcd at 19183.

<sup>7/</sup> See, e.g. Comments of Petitioners, MM Docket No. 97-217, at 158-160 (filed Jan. 8, 1998); Consolidated Opposition of Petitioners to Petitions for Reconsideration, MM Docket No. 97-217, at 3 (filed Feb. 4, 1999).

<sup>8/</sup> See BellSouth Petition, at 15.

Commission to eliminate artificial distinctions between ITFS licensees that utilize analog modulation and those that utilize digital modulation, the channel shifting rule inadvertently maintains the distinction.<sup>9/</sup>

## **II. THE IPWIRELESS PETITION**

### **A. THE COMMISSION SHOULD AMEND ITS RULES AS PROPOSED BY IPWIRELESS TO PROMOTE THE RETAIL DISTRIBUTION OF RESPONSE STATIONS.**

The Petitioners agree with IPWireless that the Commission should adopt rules codifying the so-called “Qualcomm exception” adopted in the *Reconsideration Order* that allow low-power response stations to utilize non-directional antennas.<sup>10/</sup> In so doing, the Petitioners note that the Commission has eliminated the risk of interference inherent in the retail distribution of response stations by promulgating rules requiring that a response station not be able to transmit unless authorized to do so by the response station hub, and that IP Wireless has not proposed any change to those rules.<sup>11/</sup> The Petitioners further note that IPWireless is not proposing any revision to the rule provisions under which the FCC reference antenna is utilized in conducting analyses of potential interference, regardless of the antenna actually installed at a receive site.<sup>12/</sup> Therefore, the use of

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<sup>9/</sup> See Petition of Petitioners for Further Reconsideration, MM Docket No. 97-217, at 14-15 (filed Nov. 23, 1999)[hereinafter cited as “Petitioners Petition”].

<sup>10/</sup> See Petition for Reconsideration of IPWireless, MM Docket No. 97-217, at 3-4 (Filed Dec. 22, 1999)[hereinafter cited as “IPWireless Petition”].

<sup>11/</sup> See 47 C.F.R. §§ 21.909(m), 74.939(o).

<sup>12/</sup> In adopting the “Qualcomm exception,” the Commission specifically provided that “[t]he use of omnidirectional antennas under the provisions of this waiver does not exempt the licensee from our existing requirement that interference calculations be based on the presumption that the response station utilizes a reference receiving antenna with minimum performance characteristics conforming to Figure I of 47 C.F.R. § 74.937(a). Users of omnidirectional response station receiving antennas will receive interference protection as if they were using a receiving antenna with the reference

non-directional receive antennas will not have an adverse, preclusive impact upon neighboring licensees.

**B. THE COMMISSION SHOULD CLARIFY THAT SECTIONS 21.909(M) AND 74.939(O) PRECLUDE RESPONSE STATION TRANSMITTERS FROM EMITTING RF GAUSSIAN NOISE WHEN NOT ENGAGED IN TRANSMISSIONS.**

In its Petition, IPWireless called upon the Commission to amend the spectral masks contained in Sections 21.908(d) and 74.936(f) to provide for a loosening of the out-of-band emissions limitations imposed on response stations transmitting with an EIRP of -6 dBW or less per 6 MHz channel.<sup>13/</sup> While the Petitioners do not oppose IPWireless' proposal, the Petitioners are concerned that, as a general proposition, harmful electrical interference from out-of-band emissions could become problematic unless the Commission issues a clarification of Sections 21.909(m) and 74.939(o).

The spectral mask set forth in Sections 21.908(d) and 74.936(f) is designed to minimize the possibility that response stations will transmit outside of their assigned band and cause what is, in effect, co-channel interference to adjacent channel operations. The lower the level of out-of-band emissions, the less likely those emissions are to cause interference. However, as IPWireless points out, at some level the risk of interference is outweighed by the additional cost of further attenuating out-of-band emissions. The Petitioners do not disagree with IPWireless' assessment that the cost benefit of loosening the mask for low-power transceivers outweighs the benefit of further reducing out-of-band emissions.

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pattern and will not be protected from unwanted signal levels above those derived by use of this pattern." *Reconsideration Order*, 14 FCC Rcd at 12781.

<sup>13/</sup> See IPWireless Petition, at 4-10.

Yet, as the Commission recognized in the *Report and Order*, the potential for interference from response stations is also a function of the number of response stations that are transmitting simultaneously.<sup>14/</sup> In other words, the more response stations that radiate towards a given location at a given time, the more likely it is that interference to an adjacent channel operation will occur at that location. Or, conversely, the fewer response stations that radiate towards a given location at a given time, the less likely it is that interference to an adjacent channel operation will occur at that location. And that is where the Petitioners believe Sections 21.909(m) and 74.939(o) of the Rules come into the discussion. Those sections provide, in pertinent part, that a

response station shall be operated only when engaged in communications with its associated [MDS or ITFS] response station hub or [MDS or ITFS] station or booster station, or for necessary equipment or system tests and adjustments. . . . Radiation of an unmodulated carrier and other unnecessary transmissions are forbidden.<sup>15/</sup>

As such, Sections 21.909(m) and 74.939(o) play a critical role in reducing the number of response stations that can be radiating simultaneously, minimizing the potential for interference from, among other things, out-of-band emissions. Because there appears to be some uncertainty within the industry as to the meaning of these sections, the Commission should utilize this opportunity to clarify that a response station's transmitter must be biased off so that no RF Gaussian noise will be emitted when the response station is not engaged in communications. By doing so the Commission will assure that the noise floor of adjacent channel and adjacent market licensees is protected against unnecessary emissions from transceivers.

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<sup>14/</sup> See *Report and Order*, 13 FCC Rcd at 19129-36.

<sup>15/</sup> 47 C.F.R. §§ 21.909(m), 74.939(o).

### III. THE CTN PETITION

#### A. THE PETITIONERS DO NOT OPPOSE ISSUANCE OF CERTAIN “CLARIFICATIONS” REQUESTED BY CTN.

Although the following section of this pleading will be devoted to the one issue where Catholic Television Network (“CTN”) and the Petitioners take divergent views, the Petitioners do not oppose adoption of all of CTN’s suggestions. For example, the Petitioners do not oppose CTN’s call for the Commission to “clarify” that ITFS receive sites registered prior to the September 17, 1998 cut-off for the registration of ITFS receive sites do not lose their status as registered ITFS receive sites merely because the licensee engages in a channel swap or technical modification to its facilities.<sup>16/</sup> Although the Petitioners believe that the current rules provide no basis for stripping an ITFS receive site of registered status upon a channel swap or technical modification, the Petitioners do not object to the issuance by the Commission of a clarification to ease CTN’s concerns.

Similarly, the Petitioners question whether it is necessary for the Commission to issue, as requested by CTN, a clarification that all MDS and ITFS licensees must cooperate to identify sources of interference.<sup>17/</sup> Sections 21.902(a) and 74.903(d) of the Rules already broadly require licensees “to cooperate fully and in good faith in attempting to resolve problems of potential interference . . .”<sup>18/</sup> The Petitioners are unaware of any licensee ever contending that these rules do not obligate it to assist in identifying the source of interference, nor can the Petitioners ever conceive

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<sup>16/</sup> See *Petition for Clarification and Further Reconsideration of Catholic Television Network*, MM Docket No. 97-217, at 8-10 (filed Dec. 22, 1999)[hereinafter cited as “CTN Petition”].

<sup>17/</sup> See *id.* at 11-12.

<sup>18/</sup> 47 C.F.R. §§ 21.902(a) and 74.903(d).

of the Commission agreeing with such an interpretation of the rules. Nonetheless, if the Commission believes that a clarification along the lines CTN requests is in order, the Petitioners have no objection.

**B. TO AVOID THE PRECLUSION OF NEW OR MODIFIED FACILITIES CONTEMPLATED BY NEIGHBORS, THE COMMISSION SHOULD REJECT CTN'S PROPOSAL TO PERMIT THE REGISTRATION OF RECEIVE SITES BEYOND THE BOUNDARY OF THE CIRCULAR 35-MILE RADIUS PSA**

While, as noted above, certain of the proposals advanced by CTN are not objectionable, the Petitioners must strongly oppose CTN's call for reconsideration of the decision announced in the *Report and Order* and confirmed in the *Reconsideration Order* to cease the registration of ITFS receive sites as of September 17, 1998. That decision, which is inextricably linked with the award of a circular 35-mile radius PSA to all ITFS stations, is an integral part of the new regulatory regime for ITFS crafted by the Commission in this proceeding. As such, it cannot be reversed without doing substantial damage to the Commission's efforts to promote improved efficiency in the use of the ITFS spectrum.

At the outset, the Commission should understand two fundamental points regarding the Petitioners' position. First, the Petitioners concur with the Commission's decision to afford protected status to ITFS receive sites that are located outside of the PSA and were registered prior to the September 17, 1998 cut-off. Although the protection of those distant receive sites will inevitably diminish the extent to which other ITFS licensees can provide innovative new services under the rules adopted in this proceeding, the Commission's "grandfathering" of receive sites that were registered when the new rules were adopted represents an acceptable balancing of competing interests.

Second, the Petitioners have no objection to permitting an ITFS licensee to establish new receive sites outside of its circular, 35-mile radius PSA on the same basis as an MDS licensee. In other words, just as MDS licensees routinely provide service outside their PSA on a secondary basis without protection against possible interference, ITFS licensees should be permitted to establish new receive sites outside their PSA on the same secondary basis.<sup>19/</sup> Indeed, the Petitioners find nothing in the *Report and Order* or the *Reconsideration Order* that prevents an ITFS licensee from doing so. Thus, CTN goes too far when it paints the Commission's policy against registration of new, distant receive sites as "a strict geographic limitation on ITFS receive sites."<sup>20/</sup> To the contrary, just as MDS licensees have routinely provided service to subscribers outside of the geographic boundary of their PSAs, ITFS licensees are free to serve any receive site that can secure an acceptable signal.

Reduced to its essence, the issue before the Commission is a simple one -- should an ITFS licensee be permitted to register new, distant receive sites outside its PSA and, in the process, preclude the establishment of new ITFS stations or modifications to existing ITFS stations? The

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<sup>19/</sup> See *Amendment of Parts 21, 74 and 94 of the Commission's Rules and Regulations with Regard to Technical Requirements Applicable to the Multipoint Distribution Service, the Instructional Television Fixed Service and the Private Operational-Fixed Service*, 45 Fed. Reg. 29,350, 29,353 (May 2, 1980) ("We recognize, however, that the potential effective service area of an MDS station . . . may extend well beyond the boundary of the protected signal area proposed above. As under the present rules, a carrier would continue to be able to serve any potential subscriber without regard to location or quality of service."); *Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service, Implementation of Section 309(j) of the Communications Act - Competitive Bidding*, 11 FCC Rcd 17,003, 17,004 (1996); *Amendment of Parts 21, 43, 74, 78, and 94 of the Commission's Rules Governing Use of the Frequencies in the 2.1 and 2.5 GHz Bands Affecting: Private Operational-Fixed Microwave Service, Multipoint Distribution Service, Multichannel Multipoint Distribution Service, Instructional Television Fixed Service, & Cable Television Relay Service*, 10 FCC Rcd 7074, 7077 (1995).

<sup>20/</sup> CTN Petition, at 6.

*Reconsideration Order* answered that question with a resounding “No,” finding that allowing such preclusion

is inconsistent with the plain meaning of Section 74.903(a)(5). Limiting protection to a 35 mile radius provides certainty to co-channel and adjacent channel entities, especially now that booster stations can originate signals.<sup>21/</sup>

That decision was correct when rendered, and CTN has presented the Commission with no argument that would justify a reversal of course.

The fundamental flaw in the CTN Petition is that it fails to even acknowledge that protecting new ITFS receive sites outside of a licensee’s 35-mile radius PSA will have adverse consequences that must be weighed against any possible benefits. Although ignored by CTN, the Commission cannot forget that if an ITFS licensee is permitted to establish new protected receive sites outside of its PSA, neighboring educational institutions might be forced to forego the opportunity to utilize their spectrum for delivering innovative broadband services. One can readily envision a situation in which the registration of a single distant receive site will preclude a neighboring ITFS licensee from making system modifications that would benefit thousands of students.<sup>22/</sup> To allow that to occur would be an inefficient use of the ITFS spectrum and undermine the Commission’s efforts to “facilitate the most efficient use of the affected spectrum . . . and to provide benefits to the educational community through the use of two-way services, such as high-speed Internet service.”<sup>23/</sup>

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<sup>21/</sup> *Reconsideration Order*, 14 FCC Rcd at 12774.

<sup>22/</sup> The Commission should note that distant ITFS receive sites tend to be difficult to protect from interference because the desired signal level tends to be lower due to the distance from the transmit site.

<sup>23/</sup> *Report and Order*, 13 FCC Rcd at 19115.

The *Report and Order* anticipated that “the increased Internet access abilities available to ITFS licensees as a result of this rulemaking will help further the goal of providing fast, reliable and affordable Internet access to every student in the country.”<sup>24/</sup> It would be a shame if that promise went unfulfilled because the Commission allowed ITFS licensees to secure interference protection for receive sites far removed from their PSA.

This fundamental flaw in CTN’s analysis is starkly illustrated by its reliance on a 1990 decision by the Commission which specifically found that “a protected service area is fundamentally incompatible with the specific purpose and unique needs of ITFS” and preserved the right of an ITFS licensee to register receive sites more than 35 miles from its transmitter.<sup>25/</sup> Much has changed in the way ITFS is regulated in the decade since, particularly in this proceeding. Although elsewhere in its filing CTN recognizes that “the Commission has adopted a completely new service regime for ITFS and MDS stations,” its argument for preservation of the registration of distant receive sites is grounded in an old regime that focused on specific receive sites, not service areas.<sup>26/</sup> What CTN fails to acknowledge is that the Commission’s grant of a circular 35-mile radius PSA to all ITFS stations and its concurrent elimination of individual receive site registration is part and parcel of a new regulatory regime. While in 1990 geographic service areas may have been irrelevant to ITFS regulation, the new circular, 35-mile radius PSA is now at the core of the ITFS regulatory scheme.

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<sup>24/</sup> *Id.* at 19117.

<sup>25/</sup> See CTN Petition, at 7, citing *Amendment of Parts 21, 43, 74, 78 and 94 of the Commission’s Rules Governing Use of the Frequencies in the 2.1 and 2.5 GHz Bands*, 5 FCC Rcd 6410, 6419 (1990).

<sup>26/</sup> CTN Petition, at 9.

The PSA not only defines the area for which protection is offered, but it also sets the boundary of the area in which booster stations, response stations and response station hubs can be located.<sup>27/</sup> It now is at the core of defining the area in which an ITFS licensee can expect to provide innovative two-way services.

In short, the Commission correctly determined in the *Reconsideration Order* that the preclusive effect of protecting distant receive sites outweighed any benefit that might be realized. CTN has failed to present any evidence that the Commission can protect distant receive sites without unduly restricting the ability of neighboring ITFS licensees to meet their educational objectives. Thus, the Commission should reject CTN's proposal for the registration of distant receive sites.

**C. IN RESPONSE TO THE ISSUES RAISED BY CTN'S PETITION REGARDING APPENDIX D, THE PETITIONERS (FOLLOWING CONSULTATION WITH THE ENGINEERING CONSULTANT TO CTN AND OTHERS) PROPOSE SEVERAL CHANGES TO THAT DOCUMENT.**

In its Petition, CTN raised several issues regarding "Methods for Predicting Interference From Response Station Transmitters And To Response Station Hubs And For Supplying Data On Response Station Systems," which was annexed to the *Report and Order* as Appendix D (the "Methodology").<sup>28/</sup> In response, the technical consultant to the Petitioners has engaged in a dialog with CTN's consulting engineer and others within the industry who have begun to implement the Methodology. That dialog has led to a consensus that several corrections, clarifications and improvements are desirable to advance the Commission's objective of creating a uniform Methodology that minimizes the risk for interference and provides the industry with certainty as to

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<sup>27/</sup> See 47 C.F.R. 74.939(d)(3)(i)-(ii), 74.939(g)(1), 74.985(b)(1), 74.985(e)(4)(v).

<sup>28/</sup> See CTN Petition, at 12-13.

what is required of an applicant and is not unduly difficult to implement. A proposed revised Methodology is annexed hereto as Appendix A. What follows is a listing of the specific changes that are proposed at this time, accompanied by a rationale for each proposal. Changes are listed more or less in the order in which they appear in the Methodology.

1. In the third paragraph of the section on Defining Grid of Points for Analysis, language has been added to require that the geographic orientation of each sector be specified to the nearest tenth degree, to conform to the provisions of the File Format section.

2. In the fifth paragraph of the section on Defining Grid of Points for Analysis, the first sentence has been changed to clarify the method for defining the Analysis Line.

3. In the section on Defining Regions and Classes for Analysis, a new paragraph has been added to clarify the way in which response stations are counted with respect to the limit on the number of simultaneously operating stations on a channel. This corresponds to the change in the rules sought by the Petitioners in their Petition for Further Reconsideration.

4. In the second paragraph of the section on Determining System Configuration, the words “any part” on the first line have been changed to “all” to clarify what is meant

5. In the section on Determining System Configuration, in the last three paragraphs the word “operating” has been changed to “transmitting” for clarification and consistency purposes.

6. In the section on Calculating Aggregated Power from Transmitters, in the second paragraph, the word “operating” is changed to “transmitting” and the word “power” is changed to “EIRP” at the first two places it appears for purposes of clarity and consistency.

7. In the section on Calculating Aggregated Power from Transmitters, a new paragraph is added to clarify that either of two methods may be used to calculate interference, taking into account

the use of power spectral density, as provided in the Rules. The two methods are (i) the use of subchannels together with the appropriate correction factor, as described in the Rules, or (ii) the use of a full 6 MHz channel having the same power spectral density as any of the subchannels.

8. In the section on Protection to Response Station Hubs the word “that” prior to “1 dB” has been changed to “than” to correct a typographical error.

9. In the section on Protection to Response Station Hubs, a new item 5 has been added as “any electrical beam tilt to be utilized,” and a new item 7 added as “the direction of any mechanical beam tilt utilized.” The other items have been renumbered as appropriate.

10. In the “Where” statement associated with Equation 1, a new parenthetical note has been added at the bottom, just before the existing parenthetical note, “(Relative to peak of main lobe, the value of which is 0 dB).”

11. In the paragraph prior to Equation 3, wording has been changed to indicate that factors to be considered in the calculation of the equivalent power flux density of the thermal noise power include receiver noise figure, the cable losses between antenna and receiver input and the wavelength of the signal. Furthermore, to provide a standard method for evaluating the effects of these factors and to prevent design mischief, additional language requires the noise figure to be specified as 2.5 dB, and cable losses to be specified as 1 dB. Revisions require that values for the wavelength also must be specified.

12. Equation 3 has been changed to the formula proposed in CTN’s comments. The proposed changes include both the addition of the factors mentioned in item 9 above and a correction to the Where statement following Equation 3 to include the added factors and their associated standard values.

13. In the last paragraph of the section on Protection to Response Station Hubs, there has been a slight word change and a parenthetical statement added clarifying how to correctly set the power flux density of the interference to zero mathematically.

14. In the section on Defining Grid of Points for Analysis, the grid of points is currently defined in terms of spacing between points measured in integer numbers of seconds. The intention was to allow any integer number of seconds to be used for the spacing value. In the section on the File Format, at the end of the introductory section, Units of Measure are given. There, values for latitude and longitude are shown as being expressed in degrees, minutes, and integer seconds. The inadvertent result of this form of expression has been that grid points can only be separated by even numbers of seconds. This conflicts with the intention of the descriptive section, which contemplated use of any integer number of seconds — odd or even. The result of forcing use of only even numbers of seconds for grid point spacing is that, in a large proportion of cases, a much greater number of grid points is required than is necessary. Because the number of grid points is non-linear, the computation time for performing analyses then increases quite significantly. To solve this problem, it is proposed to change the permitted form of expression of the locations of the hub and of the grid points to allow the use of tenths of a second precision. Conforming modifications to the Methodology have been implemented in the section on File Format and to the Units of Measure, and to the Example File Format and Template.

15. In the last two paragraphs of the section on Calculating Aggregated Power from Transmitters, methods for actually determining whether the appropriate power flux density limits and D/U ratio interference benchmarks are met have been added. Elsewhere, the Methodology has gone to great lengths to specify the locations (grid points) to be used to represent response station

transmitters. However, points to be used to represent receiving locations are almost completely unspecified in the methodology. If consistency is to be achieved in the results obtained by different engineers studying a given system, the receiving points must also be specified in a manner similar to the specification of the transmitter locations. Therefore, this section of the Methodology has been revised by specifying a defined study grid in the neighboring, non-overlapping PSA or BTA. This follows the procedure used to define the grid points in the RSA except that the study points will be located at a fixed spacing of 1.5 km. They will surround the reference point for the PSA or BTA, being positioned at the intersections of north-south and east-west lines that are equidistant from the reference point and from each other. PSAs have defined reference points; BTAs do not. The reference point to be used for a BTA consequently must be defined for purposes of the Methodology. The Petitioners suggest that it be the point, measured in degrees, minutes, and seconds (to the nearest tenth second), that is midway between the eastern- and western-most extremes of the BTA and midway between the northern- and southern-most extremes of the BTA. When the RSA and the PSA or BTA being studied overlap one another, a finer study grid than 1.5 km should be employed. The study grid then must use evenly spaced (in km) north-south and east-west lines that include all of the points on the normal 1.5 km grid. That is, an integer number of additional north-south and east-west lines should be added between each pair of 1.5 km-spaced lines, but the normal lines would not be changed.

16. In the first paragraph of the Propagation Model section, changes have been made to make clear that use of the model described in the Methodology is required for all interference analyses involving response stations or response station hubs, as required by the *Report and Order*.

17. At the end of the introductory section on the Propagation Model, there is a paragraph providing for protection only to the noise floor of a receiver receiving interference from response stations. This paragraph has been moved to the end of the section on Calculating Aggregated Power from Transmitters and the working modified to clarify that interference protection from response stations to receivers in neighboring systems is to the receiver noise floor for cochannel signals and to the operating level for adjacent channel signals. In other words, for cochannel signals, there is no need for the undesired signal to fall below the noise floor of the receiver when the desired signal is insufficient for reception absent interference. For the adjacent channel signals, there is no need for the undesired signal to fall below the level of the weakest signal that can be received with full S/N ratio, *i.e.* 45 dB above the noise floor, when the desired signal falls below that level.

18. The Methodology requires use of a specified propagation model. That model includes an excess path loss component derived from reflection loss calculations. The reflection loss can take on either positive or negative values. Reflection loss is calculated using the transmitter and receiver geographic locations and the respective antenna heights above ground level. Because the wavelength in the 2.1 to 2.7 GHz region of the spectrum is on the order of four inches, a change in the antenna height or site elevation of this magnitude can cause a change in the result from totally destructive (subtractive) to totally constructive (additive) reflection loss values. Unfortunately, the accuracy of the site location and elevation parameters is on the order of feet, not inches. Thus, through happenstance of the selection of parameters, a study point may garner a predicted D/U ratio that is well below the allowed value, when, in reality, the site has a more than adequate D/U ratio. The reverse case is also possible. Consultation with the originator of the propagation model indicates that the reflection point calculation is intended mostly for situations with large expanses of water in

the path or large areas of flat terrain near one end of the path or the other. Existing practical implementations of the technique have the ability to turn off this calculation. Discussion among members of the engineering community has indicated that this feature is normally not used and a strong sentiment arose that it should not be allowed as part of the Methodology. Consequently, it is recommended that the section on Two-Ray Field Strength at the Receiver Using a Single Ground Reflection should be removed in its entirety. As a result, equations in following sections of the proposed Methodology have been renumbered, and Equations 21 and 22 (original equation numbering prior to renumbering as a result of removal of the section) have been modified to remove the  $A_{\text{reflection}}$  term from each and from the supporting text.

19. In the CTN Petition, CTN's engineering consultants suggest a change in the constant used to determine the impact of partial obstruction of the first Fresnel zone in the section on Attenuation Due to Partial Obstruction of the Fresnel zone. They suggest a value of 547.533 in lieu of the 549.367 currently included in Equation 20. The difference derives largely from rounding errors that occurred in calculations of the value many years ago before there were computers and from using a different starting point. The difference in the result that will be obtained with the changed constant amounts to about 0.02 dB — well within the tolerance band of the rest of the propagation model. Nevertheless, the Petitioners' agree that changing the value would contribute to greater accuracy. The attached proposed Methodology includes the suggested change.

20. In the Propagation Model, in the section on Diffraction Loss, a number of typographical errors have appeared in formulas in the group of Equations 23-30 (original numbering) in some of the versions of the document released by the Commission. The proposed Methodology has been revised to include the correct values in renumbered Equations 10-17.

21. An item that was not specified in the original Methodology but which must be precisely defined in order to assure consistency of results between engineers is the spacing of terrain elevation sample points to be used along the path from the transmitter to the receiver in conducting Propagation Model studies. The Petitioners proposed that this value be set to 0.25 km, with points along the radial from transmitter to receiver starting at the transmitter and ending at the 0.25-km point just prior to the actual receiver location. The study itself should end at the actual receiver location. This requirement has been inserted as a new paragraph at the end of the Propagation Model Outline section. In addition, it has been clarified that all the propagation model studies are to be based upon use of the USGS 3-second database and that the elevation at specific points is determined using bilinear interpolation from the surrounding 3-second points.

22. In the section on Determining System Configuration, an exception is provided allowing elimination of interference analyses from specific grid points to neighboring systems or to points within those systems when there is path blockage. For points in the neighboring system that have line-of-sight to potentially interfering grid points, studies are to be conducted using the required propagation model. This has led to some confusion about when the non-line-of-sight (NLOS) mode included in the propagation model is activated. Petitioners believe it should be activated in three cases: for the desired signal in neighboring systems when interference from response stations is analyzed and for both the desired and undesired signals when interference to response station hubs is analyzed. To avoid confusion in the future, the Petitioners are proposing that sentences be added in the sections on Determining System Configuration and on Protection to Response Station Hubs specifying the cases in which the NLOS mode can become activated.

23. The original Methodology drew upon and integrated a number of prior works. It retained the dimensioning of its sources, leading to some inconsistencies. The Methodology would be easier to implement if of all its dimensions were consistent. In keeping with current FCC practice, the Petitioners are proposing that all dimensions be based on the metric system. Changes have been made at various places throughout the revised Methodology, but particularly in the File Format section. Mostly feet and miles are changed to meters and kilometers, respectively. This is indicated in the list of units of measure in the File Format section and embodied in the Example File and Template of the attached proposed Methodology.

24. One set of data that was not included in the file format of the original Methodology is the frequency plan for each response station hub system. It would make the exchange of data between licensees and the Commission and between licensees themselves considerably easier if this information were included in the submission on disk. Thus, it is proposed to add a section to the File Format covering the frequency plan. The frequency plan is addressed in new sections in two places: as a new section in the descriptive section on the File Format, and as a new section within the Example File and Template. The structure of the new section is derived from inputs received from several implementers of software algorithms for conducting system designs and interference analyses based on the Methodology. It is fully explained in the new descriptive section in the proposed revised Methodology. Fundamentally, the proposed revisions to the frequency plan section provide for a listing, by antenna sector number, of the starting and ending frequencies of each band segment to be used for upstream transmission within that sector. One set of entries is required for each sector. An indication is required of the number of such band segments associated with each sector. Band segments used within a sector would be listed by the channel number from which they were drawn.

The actual subchannelization used within each band segment would not be specified as it can be changed by the licensee without notice to the Commission and may be changed dynamically during operation.<sup>29/</sup>

25. Although not required by the Rules, the original Methodology presumed that the response station hub (“RSH”) would be inside the response service area (“RSA”). Some initial design efforts have shown that this condition may not always pertain, *e.g.*, in a system with the hub on a hill and the RSA in a valley some distance away. Consequently, procedures must be provided for use when the hub is outside the RSA. These methods must include a means for describing the location of the RSA, a means for describing the reference point for the RSA without using the hub as that reference point, and a method for determining that an adequate number of grid points is used within the RSA. The revised Methodology provides that when an RSA does not encompass its RSH, a reference point must be indicated for the RSA, no matter whether it is described using the circular area geographic definition method or the non-circular area method. In fact, this situation is already partially supported by the existing method, but only for circular areas. It is not supported for non-circular areas. In the General Information section of the file format, the hub coordinates are given. What is required is to provide a separate place to indicate the reference point for the RSA. When it is identical to the RSH coordinates, the hub is contained within the RSA; when it is different from the hub coordinates, the hub is outside the RSA. There is already provision for storing the RSA “center” latitude and longitude in the section for Geographic Boundary Definitions – Circular Areas Only, in what is designated RSA 00. This has been changed to be the “Reference” latitude and

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<sup>29/</sup> See *Report and Order*, 13 FCC Rcd at 19120-21.

longitude, which can then apply to both circular and non-circular RSA cases. The RSA radius value would be omitted in cases of non-circular RSAs. The grid of points would be constructed around this reference point. The reference point to be used for RSAs that do not encompass the hub would be determined in the same manner proposed for determining the reference point for BTAs. In other words, the reference point would be the point, measured in degrees, minutes, and seconds (to the nearest tenth second), that is midway between the eastern- and western-most extremes of the RSA and midway between the northern- and southern-most extremes of the RSA. This would apply in both the circular and non-circular RSA cases. Several sections of the File Format and Example File & Template sections have been modified to provide for these changes. The one remaining change required to address RSAs with external hubs is to define how to determine the number of grid points required for interference analyses. The general method of establishing a uniform field through dividing the grid points into two groups and comparing their aggregate power levels at the analysis line is still applicable in this case. Where sectorized RSH antennas are used, however, provision must be made to calculate the minimum number of grid points per sector, as currently described in the next-to-last paragraph of the section captioned Defining Grid of Points for Analysis. This has been done simply by changing the language to consider the difference in distances from the hub to the nearest point to the hub and to the furthest point from the hub within each sector when determining the minimum number of points required per sector. The same formula would apply as in the case of RSAs that contain their hubs.

26. Following the first paragraph of the section on File Format, a paragraph has been added to clarify that a separate file is to be provided describing each RSH and associated RSA in a system. This is in keeping with the fact that each RSH/RSA pair is separately licensed. Multiple files should

be permitted to be submitted on a single floppy disk. To aid analysis of complete systems, a separate ASCII file, listing all of the files for all of the RSHs in the system, should be required. The Petitioners propose that it include the file names, dates and times, and sizes in bytes for each RSH included in the system. A copy of this File List file should be placed on every disk associated with the system. This information will make it possible for others to determine that they have the complete and proper set of files for analysis purposes. Furthermore, a requirement has been added to the effect that all disks must be properly labeled with their contents, including the related information required in the File List file.


27. Two types of situations arise in defining regions that are implicitly supported in the definitions of the File Format, but they are not readily apparent and may not be recognized without explicit statement. The first situation is one in which there are nested circular regions. In this case, the innermost region will truly be circular. The remaining regions will be annular rings having an inner and an outer radius. The inner radius will be the outer radius of the region just inside the particular region. The outer radius will be that specified in the File Format for the region under consideration. Nested regions will be determined by their having identical center points. Circular regions can be specified that fall within other regions and subtract from them but that do not share a common center point; in these situations, the non-circular geographic boundary definitions method must be used. The second situation is one in which regions are defined that do not completely cover the area of the RSA. The regions involved in this situation can be either circular or non-circular. Any portion of the RSA not covered by any region should be ascribed to Region 00, and at least one class of station must be assigned to Region 00 if it exists. Thus grid points that fall between non-concentric circular regions, that fall between defined non-circular regions, or that fall outside the

largest of a concentric group of regions would all be ascribed to Region 00. Region 00 would then be treated in the same fashion as any other region insofar as the association of classes of stations, the definition of grid points, and the like. Consequently, language has been added, both in the section on Defining Regions and Classes for Analysis and in the section on the File Format, providing details on the handling of the two situations.

28. The data layout described in the existing File Format section and the Example File & Template use what can be described as “spreadsheet form” for collecting much of the data. Discussions with a number of organizations and individuals that are implementing software systems to conduct the necessary analyses and to prepare the files for submission indicate that a different structure would simplify computer export and import. The preferred structure uses a “streaming” or listed approach to the formatting of the data. Because there was such unanimity among implementers that the listed layout is better for their purposes, the attached proposed revision to the Methodology incorporates that method. Fundamentally, any time a list of data is required, it is preceded with a header that identifies what is in it and gives the number of entries that it will contain. A title line to identify each of the items in an entry is also generally included. Entries can be individual items, pairs of items such as coordinates, or sets of items such as characteristics of a

class. The headers and lists are contained within the same file sections as defined in previous versions, and those sections have their own headers in the same format as hitherto.

Respectfully submitted,

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## **APPENDIX A**

### **Petitioners Proposed Revisions to “Methods for Predicting Interference From Response Station Transmitters And To Response Station Hubs And For Supplying Data On Response Station Systems”**